

Name: _____ 3/10/2016
Math 202 Quiz 1

Directions Answer all questions in the space provided and box your final answers. Good luck!

1. (6 points) For each of the following three functions, state the domain and range.

$$f(x) = \sin^{-1} x$$

$$g(x) = \cos^{-1} x$$

$$h(x) = \tan^{-1} x$$

2. (8 points) Use log rules to expand the expression $\ln \left(\frac{\sqrt[3]{xy^4}}{z^2 + 1} \right)$.

3. (8 points) One cup of coffee contains 95mg of caffeine. The half-life of caffeine in the human body is 5.7 hours. How many hours after drinking one cup of coffee does the amount of caffeine in the human body fall below 10mg?

4. (8 points) Find $\frac{d}{dx} \cot^{-1} x$ and show your work. Answers without work will not receive full credit.

5. (8 points) Differentiate the function $f(x) = x^{\ln x}$.

6. Evaluate the following integrals.

(a) (8 points) $\int \frac{a^x}{a^x - 1} dx, \quad a > 0$

(b) (8 points) $\int_{e^{\sqrt{2}/2}}^{e^{\sqrt{3}/2}} \frac{1}{x\sqrt{1 - \ln(x)^2}} dx$

7. Evaluate each of the following limits.

If a limit does not exist, say so. If you apply L'Hospital's Rule, say so.

(a) (8 points) $\lim_{x \rightarrow 0} e^{1/x}$

(b) (8 points) $\lim_{t \rightarrow \infty} \frac{\sinh t}{\cosh t}$

8. Evaluate each of the following limits.

If a limit does not exist, say so. If you apply L'Hospital's Rule, say so.

(a) (8 points) $\lim_{x \rightarrow 0^+} \sin(x) \ln(x)$

(b) (8 points) $\lim_{t \rightarrow \infty} t^{(\ln 2)/(1 + \ln t)}$